

PADDLEFISH

RESTORING A LEGACY

by Carl Richardson

Paddlefish (*Polyodon spatula*) have been around for more than 150 million years. In that time, ice ages have come and gone, temperatures have risen and fallen, and oceans have expanded and contracted. Countless species were unable to adapt to these major climatic changes and became extinct. But somehow, paddlefish adapted and survived—that is, until the 1800s.

Human activities spread over just a few generations during this time severely affected paddlefish populations. Paddlefish could survive many natural changes, but not those imposed by humans. By 1919, paddlefish were extirpated from Pennsylvania waters. This means that paddlefish lived in other waters but not in Pennsylvania. Extirpation is one step closer to extinction.

Extirpation, though, doesn't mean extinction is certain. The Fish & Boat Commission is taking steps, along with conservation partners, to restore paddlefish in Pennsylvania to the Ohio River and its tributaries.

Life of a paddlefish

With their elongated snout, or rostrum, paddlefish look a little prehistoric. The rostrum, often about a third of the fish's entire body length, isn't used to dig in the mud, as some used to believe. Scientists now believe the rostrum helps paddlefish locate food, directs the water flow into the mouth, and assists with balance.

Paddlefish feed on zooplankton. Most zooplankton are



Area 8 Fisheries Technician Gary Smith shows a moderate-sized paddlefish. Paddlefish grow rapidly. Growth records from mainstem Mississippi River fish show that paddlefish reach 40 inches in two years.

so small that you need a microscope to see them. You can imagine how much plankton is needed to feed a 30- to 50-pound paddlefish!

In the U.S., paddlefish are found in the large, free-flowing rivers of the Mississippi River Basin. In Pennsylvania, this watershed includes the Ohio, Allegheny and Monongahela rivers.

Paddlefish prefer deep water (more than 18 feet) and slow current. Ideal places include river backwaters, ox bow lakes, and areas of reduced current. Often big islands, bridge pilings, shoals and sandbars provide such sheltered areas.

Not much is known about the paddlefish's spawning habits. We do know that spawning activity is triggered by a rise in temperature and an increase in water flow. Males become sexually mature at six to nine years of age. Females mature later, between eight and 12 years of age. As water temperatures rise

near 60 degrees, paddlefish move to clean gravel bars. The results of radio tagging studies on the Mississippi and Missouri rivers show that paddlefish migrate as much as 100 miles to suitable spawning habitat. The female broadcasts her ripe eggs into the water, where they are fertilized and settle to the bottom. Mature females may release at least 10 pounds of eggs. Scientists are uncertain about the time between spawning. Some studies suggest that it may be as long as eight years until a mature female will spawn again.

Paddlefish grow rapidly. Growth records collected from fish on the mainstem of the Mississippi River show they reached sizes of 40 inches in two years. The world record is a 142-pound monster taken from the Missouri River in

Montana! There are historic photos taken along the Mississippi River of fish in the 200-pound class! Paddlefish are also long-lived, with some living more than 30 years!

Declining populations

At the end of the 1800s, the large rivers on which paddlefish depend were altered. These large river systems fed the growing country. Our rivers served as a dumping ground for pollution and were diverted to provide power and transportation. Dams became barriers to spring spawning migrations. Dams also altered flow patterns. As flow patterns changed, so did the river bottom. Dredging shipping channels, also to aid transportation, further altered prime paddlefish habitat. Paddlefish stocks declined throughout much of their range as early as 1900.

Overfishing

About the same time paddlefish stocks declined in the Mississippi River, fish populations of the Atlantic Basin also declined. Fish populations of American shad, striped bass and sturgeon were declining along the East Coast. At that time sturgeon were harvested to collect their eggs (caviar). As the populations of sturgeon declined, commercial interests, and the palates of our growing country, looked for a substitute. They found it in the paddlefish. Each female paddlefish could have as much as 10 to 20 pounds of eggs. Thus, overfishing was added to the pressure on already declining paddlefish numbers.

Paddlefish caviar is in demand even today. Even though the price can fluctuate, a pound of paddlefish caviar can sell for more than \$200. That's about half the price of domestic sturgeon caviar.

Extirpated in four states

Before 1900, paddlefish ranged well into Pennsylvania. They were found in the Ohio, Allegheny, Clarion and Kiskiminetas rivers in Pennsylvania. The last documentation of paddlefish in Pennsylvania waters was in 1919.



This machine inserts a wire tag into the paddlefish's rostrum. Before stocking, Commission staff members tag each paddlefish. The tag indicates where and when the fish was hatched and stocked. If the fish is later collected, a tag detector will indicate the presence of the wire tag. The tag can then be recovered without killing the fish, and the origin of the fish and other vital data can be determined.

In Pennsylvania, paddlefish are currently classified as extirpated.

In addition to Pennsylvania, paddlefish are considered extirpated in three states in their range: New York, Maryland and Virginia also classify the paddlefish as extirpated. In its remaining range of 22 states, 11 of those states classify paddlefish as endangered, threatened or a species of special concern.

Paddlefish comeback

Paddlefish populations are now bouncing back throughout the Mississippi River Basin. This comeback is in large part caused by improvements in water quality, the result of federal clean-water regulations passed in the 1970s. This improvement in water quality has given the paddlefish a chance to return to waters where it originally swam. Biologists refer to this as an expanding population, or a re-established population. Each year, biologists document gains made by paddlefish as they return to their native waters.

Good paddlefish habitat now exists here in Pennsylvania, on the lower reaches of the Allegheny and Monongahela rivers and the upper Ohio River. Paddlefish have been found farther downstream on the Ohio River, but expanding populations have not yet made their way into Pennsylvania. Left alone, it could be many years before populations increase enough and fish move into Pennsylvania waters.

Back after 90 years

In 1991, the Fish & Boat Commission set out to give paddlefish a helping hand in returning to Pennsylvania waters. Fingerling paddlefish were first stocked in the Ohio and Allegheny rivers as part of the Commission's Paddlefish Restoration Plan. This stocking represented the first time that paddlefish swam in the Commonwealth in more than 90 years!

The Commission's restoration plan for paddlefish includes three elements: Supplemental stocking, removing barriers to paddlefish migration and monitoring the Pennsylvania population.

Supplemental stocking

Nearly all species restoration programs include the supplemental stocking of young. The young may be collected from healthy populations. In many cases, they are grown in hatcheries to provide young for reintroduction or restoration. Adults in healthy populations serve as what biologists call brood stock, or parents, to you and me.

The Fish & Boat Commission's Linesville fish hatchery plays a key role in the paddlefish reintroduction program. About 10 weeks after Linesville receives the eggs, the paddlefish have grown to about 10 inches and are ready for stocking. Stocking usually occurs in early August. Before stocking, though, Commission staff members tag each paddlefish with a tiny coded wire, hair-thin and only a sixteenth-inch long. The coded wire, which indicates where and when the fish was hatched and stocked, is inserted into the tip of the rostrum. If the fish is later collected, a tag detector will indicate the presence of the wire tag. The tag can then be recovered without killing the fish, and the origin of the fish and other vital data can be determined.

The tagging effort is part of a multi-state study through the Mississippi Interstate Cooperative Research Association (MICRA). MICRA provides funding for the wire tags and equipment.

Each August, the Commission stocks paddlefish in the Ohio and Allegheny rivers. These fish are stocked in the Ohio River between the Dashields Lock and Dam and the Emsworth Lock and Dam. On the Allegheny, paddlefish are stocked between Locks and Dams 2 and 3 and Locks and Dams 4 and 5. The Commission has stocked nearly 75,000 fingerlings since 1991. If they survived, the first planting's fish would be sexually mature in 2001 or 2002.



Tags used for paddlefish (photo above) are eighth-inch long sections of hair-thin wire. After insertion (photo below), a tag detector (blue box in picture foreground) confirms the insertion and later determines the tag's presence when the paddlefish is recovered.

Removing barriers to paddlefish migration

Dams that provide water for navigation locks can be barriers to migrating paddlefish. Radio telemetry studies show that in certain conditions, paddlefish move through navigation locks. Essentially, they "lock through" with boat traffic. However, these same studies show that fish hang up at the lock. Currently, the Commission is negotiating with the U.S. Army Corps of Engineers to ensure passage for migrating paddlefish.

Monitoring the Pennsylvania population

In 2002, the Fish & Boat Commission, through the Penn State Cooperative Fish and Wildlife Research Unit, began an intensive two-year study to evaluate the stocking program and paddlefish population.





photo- Mark Giovannetti/stammpphoto.com

Biologists from Penn State and California University of Pennsylvania will be looking for paddlefish and conducting further studies on fingerling stocking. When paddlefish are collected, they will be checked for wire tags. If wire tags are not found, we can be quite sure that the fish didn't come from our stocking efforts. This study will also use radio telemetry to study the movements of stocked fish and the survival rate of stocked fingerlings and yearlings. The evaluation study is funded through a Wildlife Restoration and Conservation Program grant, administered by the U.S. Fish and Wildlife Service.

How you can help

Since 1992, anglers and others along the Three Rivers have been reporting paddlefish "sightings." Some paddlefish were inadvertently snagged by anglers and released. (Remember that in Pennsylvania there is no open season on paddlefish.) Three of those paddlefish were captured during other river study projects. Another two paddlefish were found dead along the shore, and one was spotted swimming below a dam. With each successive year, the average size of the fish sighted has grown. This alone is cause for hope.

You can help the paddlefish restoration effort by contacting the Commission when you see or catch a paddlefish. Provide us with the date, location and approximate size of the fish. Your information will help us evaluate not only the success rate of stocking efforts, but also fish movements. One

paddlefish sighting came from the base of Loyalhanna Dam. This means that the fish moved not only up the Allegheny River, but into the Kiskiminetas River as well!

Restoring the legacy

For as much as we take from our rivers, it is important to give something back. It is right for us to return this great fish to its place in our waters. With diligent monitoring of water pollution and persistent cleanup efforts, we can continue to improve water quality for ourselves and for the paddlefish. □

WEB Resources

www.fish.state.pa.us

Click on *Pennsylvania Fishes* book online.

www.greenworks.tv/radio/todaystory/20020604.htm. View information on a show segment on PA's paddlefish restoration.

www.nativefish.org.

General information on paddlefish.

www.umesc.usgs.gov/aquatic/fish/paddlefish/main.html.

Information on radio telemetry studies on the upper Mississippi River.

wwwaux.cerc.cr.usgs.gov/MICRA/Index.htm.

PADDLEFISH

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A LEGACY



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PADDLEFISH

Polyodon spathula

The genus name "Polyodon" means "many teeth," referring to the fish's many gill rakers. The species name "spathula," like "spatula," refers to a blade or paddle.

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PADDLEFISH

Polyodon spathula

Family overview: Paddlefish are known from fossil records to be millions of years old. In North America, and Pennsylvania, there is only one paddlefish species, *Polyodon spathula*, which is called the "paddlefish." Its closest living relative is a species that lives in China.

Identification: The paddlefish's most distinctive feature is its snout, or rostrum. This "paddle" is thought to be an organ of touch. It may also act as a stabilizer, keeping the fish swimming in a horizontal position when its jaw is extended downward during



filter-feeding. Paddlefish have many long gill rakers that let them strain tiny food organisms from the water. Its skeleton is mostly cartilage. The body color is generally medium to pale blue-gray. Young paddlefish don't have the adult's paddle-shaped snout. Young paddlefish also have teeth, which the adults lack.

Paddlefish grow rapidly and may reach five feet long when they are 17 years old. They are believed to live for 20 years or more.

photo: Mark Giovannetti/stammpphoto.com, production PFBC Bureau of Boating & Education

Unlike its sturgeon relatives, the paddlefish does not feed on the bottom. Instead, it swims near the surface or in shallow water, feeding on minute plant and animal organisms, and on small aquatic insects, like mayflies.

Restoration efforts: In Pennsylvania, paddlefish were once reported to be in Lake Erie, the Allegheny River and Clarion River, but were believed to be extirpated (no longer present in the state). Paddlefish were recently reintroduced by the Pennsylvania Fish & Boat Commission into their historical habitats in the Ohio and Allegheny rivers, in an effort to reestablish a secure, breeding population. Reintroduction efforts for species that take many years to mature require many years to determine the success of such efforts.



To purchase the Commission's limited-edition 2003 Paddlefish patch, send \$4.71 for each patch plus 29 cents state sales tax (PA residents only) for a total of \$5 each. Please include \$2 for shipping orders under \$10 and \$3 for orders \$10 or more.

Make checks payable to: Pennsylvania Fish & Boat Commission
Mail to: PA Fish & Boat Commission, P.O. Box 67000, Harrisburg, PA 17106-7000.